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Access and Forward Looking Charges SCR

Challenge and Delivery Group

8th July 2020

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Agenda

- Context
- High-level modelling framework
- Key outputs
- Consumer impacts
- Impacts on generators and other users
- Market representation and transmission network constraints
- Distribution network representation and reinforcement
- Granularity of outputs

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Context

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Project scope

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- We have been commissioned to carry out quantitative analysis to support Ofgem's impact assessment of shortlisted options packages.
- Ofgem's assessment of policy options will be ***principles based***. The quantitative modelling is designed to provide insight into the potential impacts of the options on consumers, network users and on system outcomes.
- We are not attempting to forecast actual tariffs but rather to model relative impacts of policy options on different types of users under credible future energy system scenarios.
- We draw on the ESO's Future Energy Scenarios to model future pathways.

- Given the complexity and range of options, we have adopted the principles used for modelling of the options, i.e.:
  - *Simplifying* assumptions will be required
  - Focus will be on *impactful* options
  - *Transparent* where possible
  - *Replicable* where possible
  - *Consolidation* of options to streamline modelling where reasonable

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Touch points with Delivery and Challenge Groups

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January

- Initial discussion of scope and high-level approach

February, March

- Further discussion of modelling approach
  - Key features of options modelling
  - Key assumptions
  - Behavioural analysis

Today (July)

- ***Final discussion of methodology ahead of modelling***

C. September

- Discussion of initial results and findings

High-level modelling framework

Ofgem overview of options packages and variants

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Modelling of the proposed reform options will inform our principles-based decision

- As the basis for this modelling, we are developing **packages of coherent sets of reform options** across our policy areas which **could be implemented together** and will be **modelled jointly**.
- In parallel, we are also exploring **potential sensitivities or other supporting analysis**, which may allow us to test **option variants** or isolate the impacts of **specific aspects of reforms**.

A reminder of key shortlisted options for modelling

DUoS cost models and locational granularity | Ultra long run cost model with / without spare capacity indicator | Granularity of EHV costs by primary / BSP group for EHV only / all customers | Upstream only charges, equal and opposite credits

Access rights | Improved choice of non-firm, time-profiled and potentially shared access rights.

***Principal variables for structuring modelling packages**

DUoS charge design* | Static ToU | Agreed capacity

TNUoS | Static ToU | Seasonal triad (large users) | DG charges

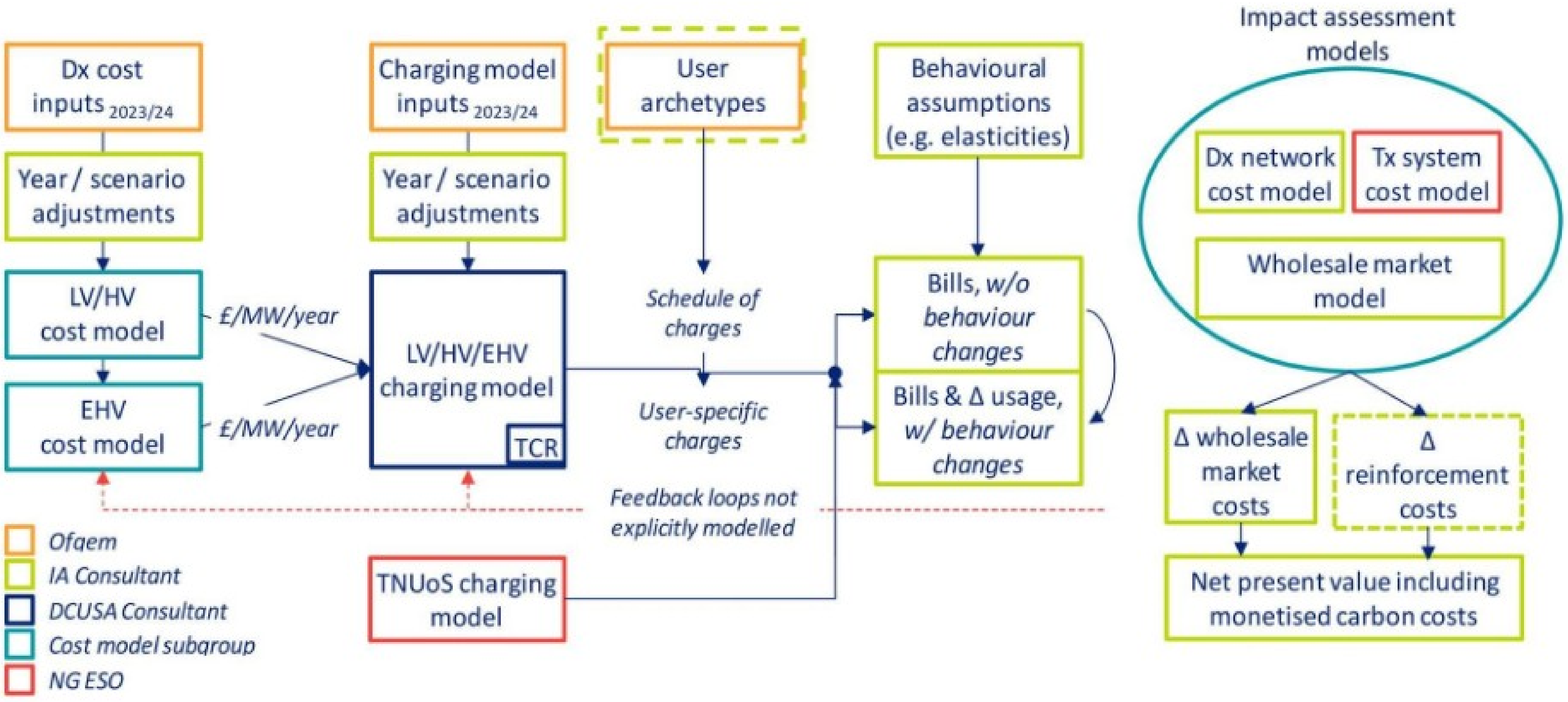
*** These may be combined and include a fixed charge component**

Connection boundary | Shallow charges | Shallower charges | Shallowish charges

Small users | Basic charging options | Adaptations – to reduce seasonality / locational granularity

We will discuss our approach to packaging options for modelling later in today's session

Reminder: High-level model architecture



*Transmission reinforcement costs will be estimated based on a sub-set of key constraint boundaries within the market model

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Reminder: Model process in practice

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Charging models
Produce set of charges

Wholesale market model
Market outcomes, transmission reinforcement and regional generation investment

D network reinforcement model
Modelling of inter-regional location of generation investment (D network scale)

D network reinforcement model
Modelling of DNO decision making (reinforcement)

Outputs:
- *DUoS Charges*
- *TNUoS charges*

Outputs:
- *Behavioural decisions*
- *Locational generation allocation*
- *Market outcomes*
- *Transmission reinforcement at key boundaries*

Outputs:
- *Locational generation allocation within D network*
- *D network capacity requirements*
- *Behavioural assumptions*

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Scenarios

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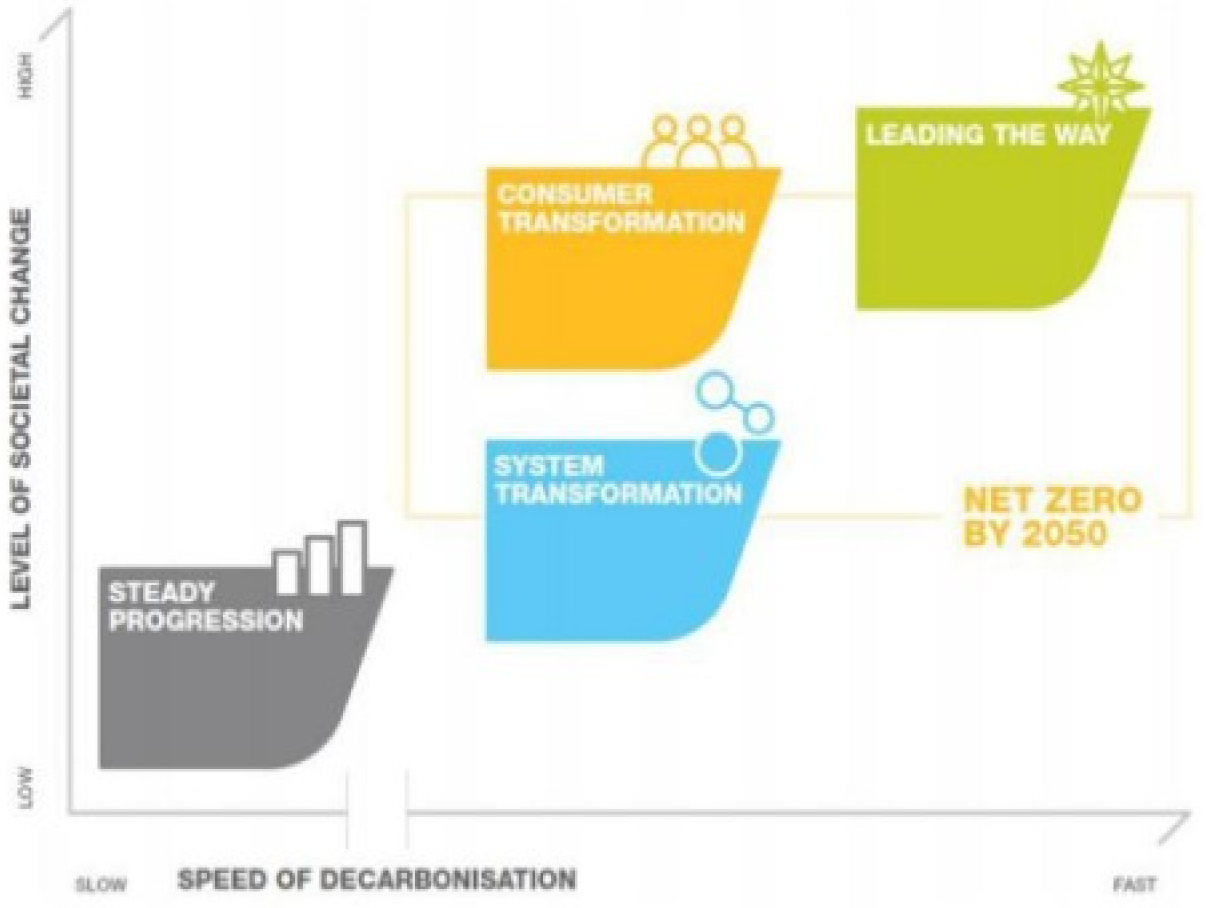
- To make modelling achievable and proportionate in time available, we will need to limit the number of scenarios we model
- We identify two objectives for scenario modelling:

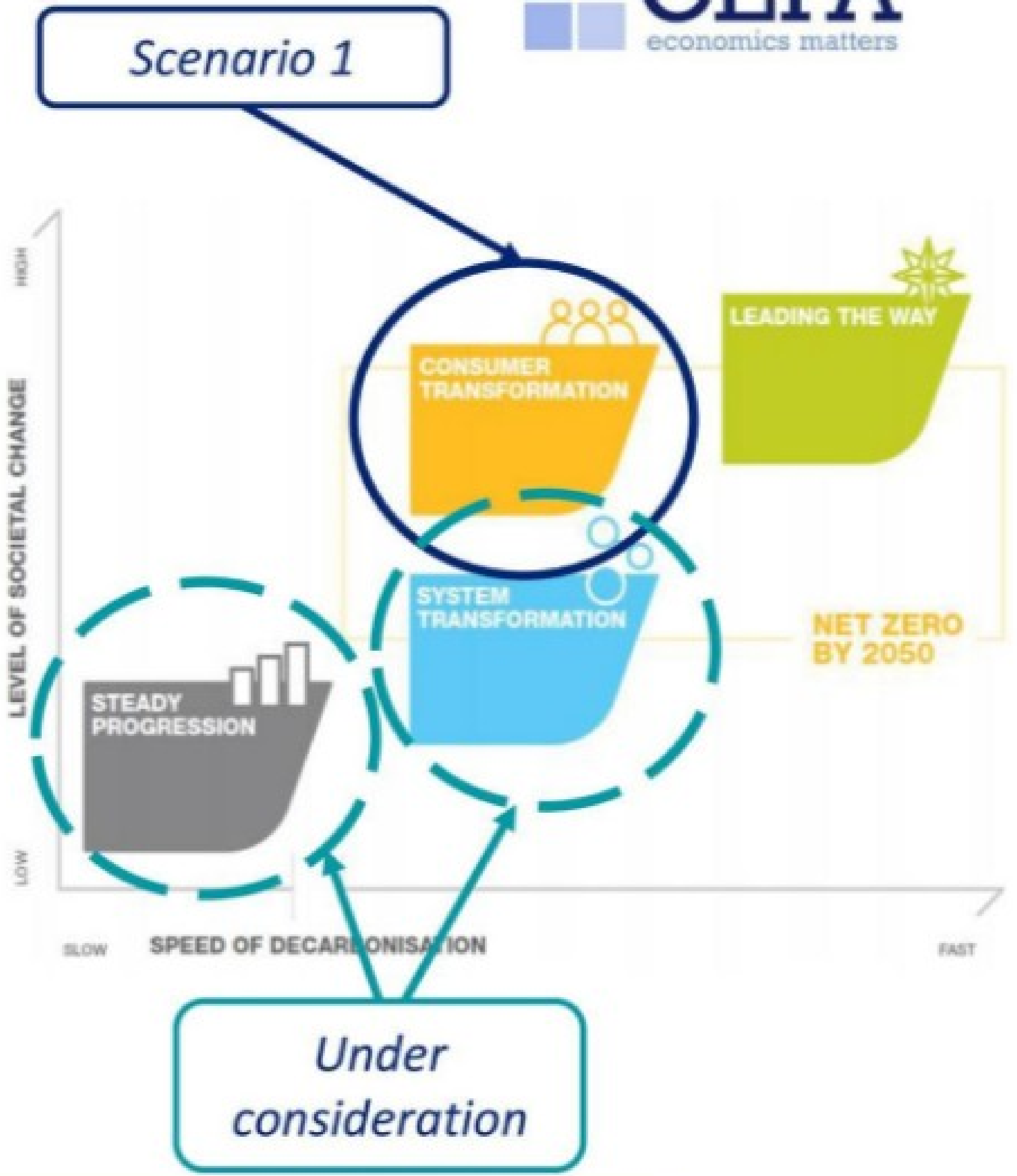
1. Testing costs and benefits under a plausible range of futures
2. Assessing the contribution / impacts of reforms in enabling certain pathways



In combination with sensitivities, we consider that two scenarios are sufficient and limit the need for trade-offs but welcome views

Scenarios

- We expect to model two scenarios:
- Scenario 1: The **Consumer Transformation** scenario:
  - Meets Net Zero targets
  - Includes more significant societal and demand side change
- As a second scenario, we are considering:
- **Steady Progression**
  - 'Worst case' decarbonisation scenario in which Net Zero targets are not met
- **System transformation**
  - Net Zero targets are met, predominantly through supply side changes



In combination with sensitivities, we consider that two scenarios are sufficient and proportionate but welcome views

Sensitivities

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- We will also consider which sensitivities should be used to test the sensitivity of impacts of different options to a range of assumptions.
- Some sensitivities may be more applicable/beneficial to certain scenarios (e.g. measuring impacts of greater behavioural change may be more relevant to Consumer Transformation scenario)
- For example, we may consider a selection of the following:
  - Testing our *behavioural response* assumptions. E.g.:
    - A sensitivity on the strength of behavioural response across all consumers
    - a sensitivity surrounding *role of automation* in future spot years
    - a sensitivity on the response of DNOs to behaviour change (e.g. reinforcement planning)
    - behavioural responses of certain users – e.g. heat pumps, large consumers
  - Targeted model runs to evaluate impacts of particular policy choices. E.g., testing impacts driven by application of option:
    - to small users
    - on distributed generation

Do you agree with using "Consumer Transformation" as our core scenario?

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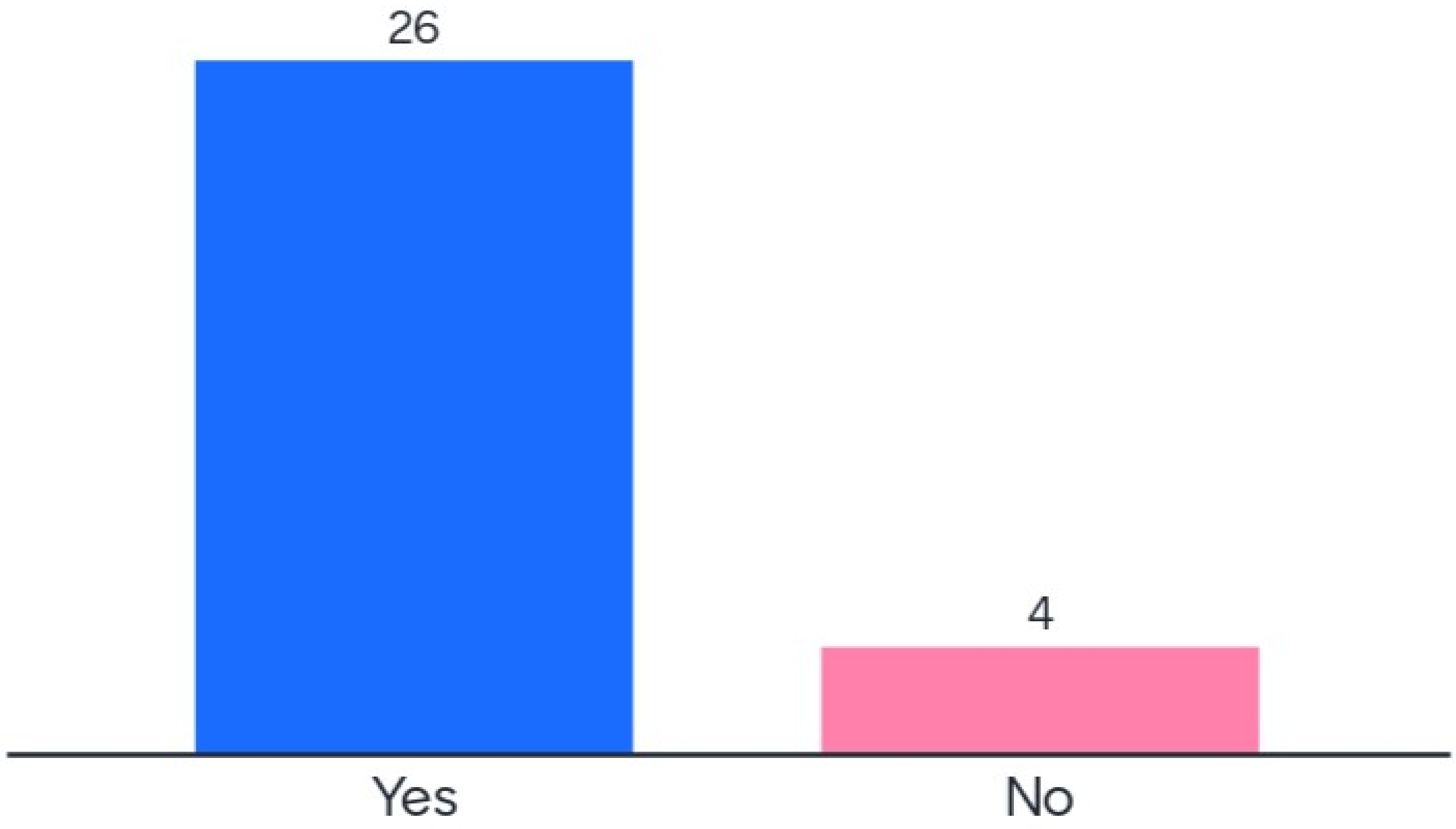

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Which second scenario do you think should be modelled?

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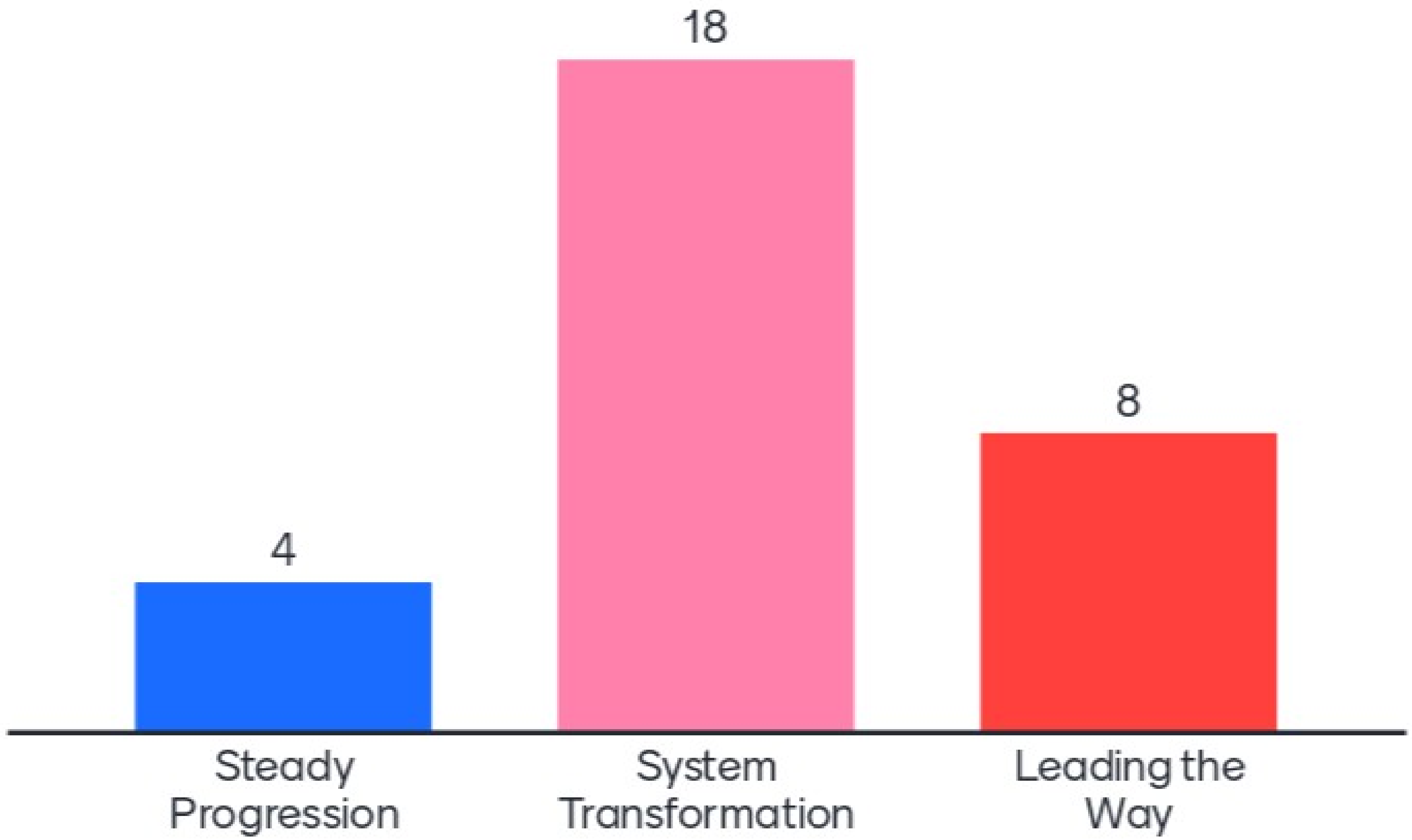

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What value do you see in a third scenario? Noting that this may result in trade-offs with other areas of modelling (e.g. sensitivities).

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Minimise scenarios if possible

Steady progression should by done in order to get full range

The two identified scenarios appear sufficient

Covering low, mid and high cases would be standard approach

Does the modelling include earlier devolved net zero targets rather than just 2050

Rather tan have a trade -off with sensitives, It is worth sticking with the the two scenarios. Those two scenarios most definitely need sensitives

Behaviour response sensitivity should be key

Value in looking at urgency that Leading the Way gives; otherwise CT and ST should be ok

Would be good to consider once FES2020 is published

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What value do you see in a third scenario? Noting that this may result in trade-offs with other areas of modelling (e.g. sensitivities).

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Leading the way should be ghe outcome if companies commit to fhe Race fo Zero and govemrenfs to their plans

Steady Progression provides a close to counterfactual comparison

It is not appropriate to answer any of those questions under this form - This is the first time I have seen this material and the invite was only released on Monday

Leading the way would give a better alignment with 2045 for Scotland so would be valuable along with the other 2 scenarios

Sensitivities suffice

no value. legal target is to get to net zero..which means there is no point in modelling steady progression

The third scenario would probably be the steady progression - but this feels likes its close to status quo - probably not needed.

Including 'leading the way' could be useful to represent the changing public ambition and drive for achieving net zero sooner

I see limited value. The key thing is to know that the charging regime works with both customer and system led decarbonisation.

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What value do you see in a third scenario? Noting that this may result in trade-offs with other areas of modelling (e.g. sensitivities).

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economic recession this may well drive ESIO to use more caution and affordable scenarios

Clear purpose is good, but requires support to warrant differentiation not based on sensitivities.

There is only value in scenarios which meet net zero (and so are lawful). Modelling all 3 would even help Ofgem to think about designing a framework top-down to achieve net zero at lowest cost, instead of piecemeal bottom-up & hoping It works out

A scenario counter factual could be assuming flexibility markets for DG, so that DG, DSR, BTMG only dispatch out of merit if there is genuinely a network constraint. Without this, you can't evaluate trade-off between network cost vs operational cost

Any further scenario which is modeled should be net zero compliant to get the full scale of impact across pathways to meet legally binding targets

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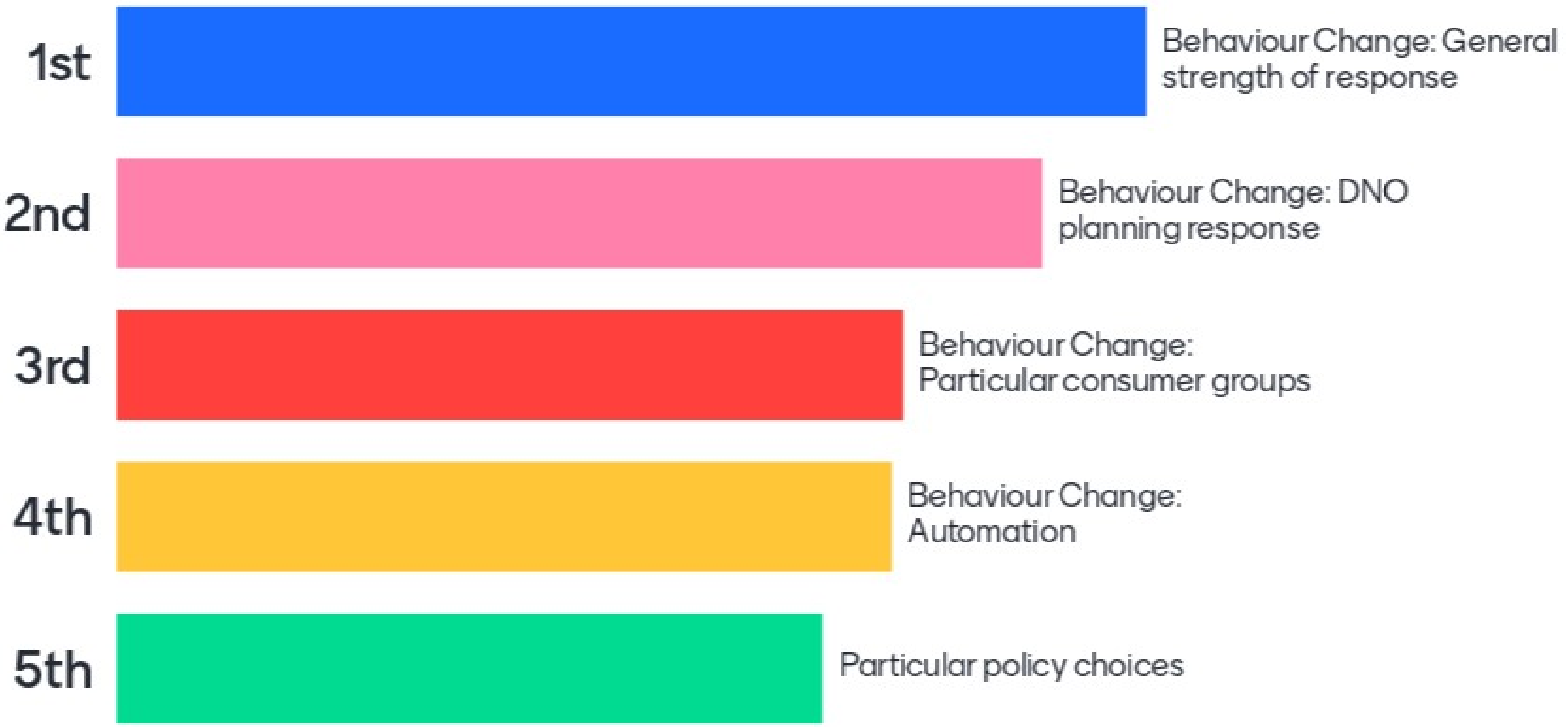
Please rank the importance of the sensitivities that have been identified below:



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Are there any sensitivities you believe should be modelled that aren't listed?

Carbon impact of use/production.

National Gird and networks resilience in general - how much they can support renewables

regional variations - eg remote/sparse areas ad/or dense urban etc.mix of heating sources and transport types

macro economic effects - would a prolonged recession have an effect

Impact of gas pricing methodology

change in working practice (office home etc) that will be the new norm

What outputs will the modelling produce that can be used as success criteria when assessing the relative success of the Access and fwd charging reform.

Visibility of pricing to end consumers

Decarbonisation at lowest cost... what does this mean for the consumer? It means: lowest costs OVERALL. At what speed is this Most effective?

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Are there any sensitivities you believe should be modelled that aren't listed?

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impact and response of large users to ambitious carbon price

Is growth / impact in different locations Assessed as part of the output? Eg spreading benefits

deployment of public buildings built or retrofitted to higher energy standards /degrees of self sufficiency where say a Mayor pushes this agenda

Regional variations

Different approaches to decarbonisation of heat

What circular impacts to subsidies and market prices there will arise from these possible reforms. Ie. higher charges raises costs for say CfD

how will this factor in new ways of working

impact os storage and EVS

industrial policy and competitiveness

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Are there any sensitivities you believe should be modelled that aren't listed?

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What if low carbon policy costs are removed from £/MWh unit rate of customer bills. This will change BTMG investment and operational dispatch

what type of technologies develop in response (intermittent/dispatchable). f factors/derating must be taken into account as this will impact dno's ability to plan

demand sensitivities from prolong change of demand patherns due to shift to WfH; more longer-term market signal impacts as a result of covid-19

Charge volatility tracking

Balanced view of the degree to which packages and options support decarbonisation

Charge volatility tracking

avoided power cuts and their value, due to these policies

The scale of impact on transmission charges , which could then impact transmission connected generation deployment

carbon benefits of allowing EV and heat pump rollout without curtailment thanks to these measures, that might have been necessary under baseline when street cables cook

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Are there any sensitivities you believe should be modelled that aren't listed?

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how will this cover homes and buildings with greater energy capture and storage /behind the meter activity ?

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Key outputs

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Summary of key outputs

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Consumer impacts
Static distributional impacts (assuming no behaviour change)
Network charges
Absolute bill impact by user archetype
Bill impact as % of income by user archetype (Residential only)
Equity weighted bill impacts (Residential)
Dynamic distributional impacts (incorporating behaviour change)
Behavioural response by user archetype (i.e. load shifting)
Impact of changes in system wide price (by user archetype)
Impact of changes in applicable tariff (by user archetype)
Impact of change in behaviour (i.e. load shifting)

Generation impacts
Operational impacts
Network charges
Generation mix
Effective price captured in the market
Investment and closure impacts
Revenue impacts
Impact on costs of RES support to meet any revenue shortfall
Impacts on costs of Capacity Market to meet any 'missing money'
Locational investment decisions

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Summary of key outputs

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System-wide impacts
Carbon emissions
Costs of policy support to enable 'Net Zero pathway' installed capacity
Carbon emissions based on operational generation decisions (but with fixed installed capacity)
Other
System wide market price
Estimated costs of constraint management and costs of transmission network reinforcement

Distribution network impacts
DNO costs
Distribution network reinforcement
Use of flexibility services (simplified)
Generation/Demand
Locational decisions
Connection voltage level
Uptake of access options

Are there any outputs you'd like to see that aren't listed?

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Impact reform could have on generation projects not progressing due to potentially higher costs

It would be very helpful to see how sensitive the results are to transmission charging. If actually we all simply use power when the wind blows and when the sun shines (as its free) and minimise our use at other times, then TC become irrelevant

Charge volatility tracking

Will generation also cover behind the meter generation? It should

cost savings to DNOs from being able to procure flexibility at a discount to traditional reinforcement and the impact on consumer charges

Impact on customers choices on decarbonisation of heat

Agree

Confused about the cost of policy support. Is it a foregone conclusion then that this won't benefit net zero and that like tcr - the get out will be that's Gov problem?

Impact upon building of new generation - which technology types benefit most. And, crucially, where will these be located? Don't screw Scotland and expect net zero to happen at lowest cost to the consumer

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Are there any outputs you'd like to see that aren't listed?

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Balanced view of how packages and options support the speed of decarbonisation

Benefits of avoided power cuts

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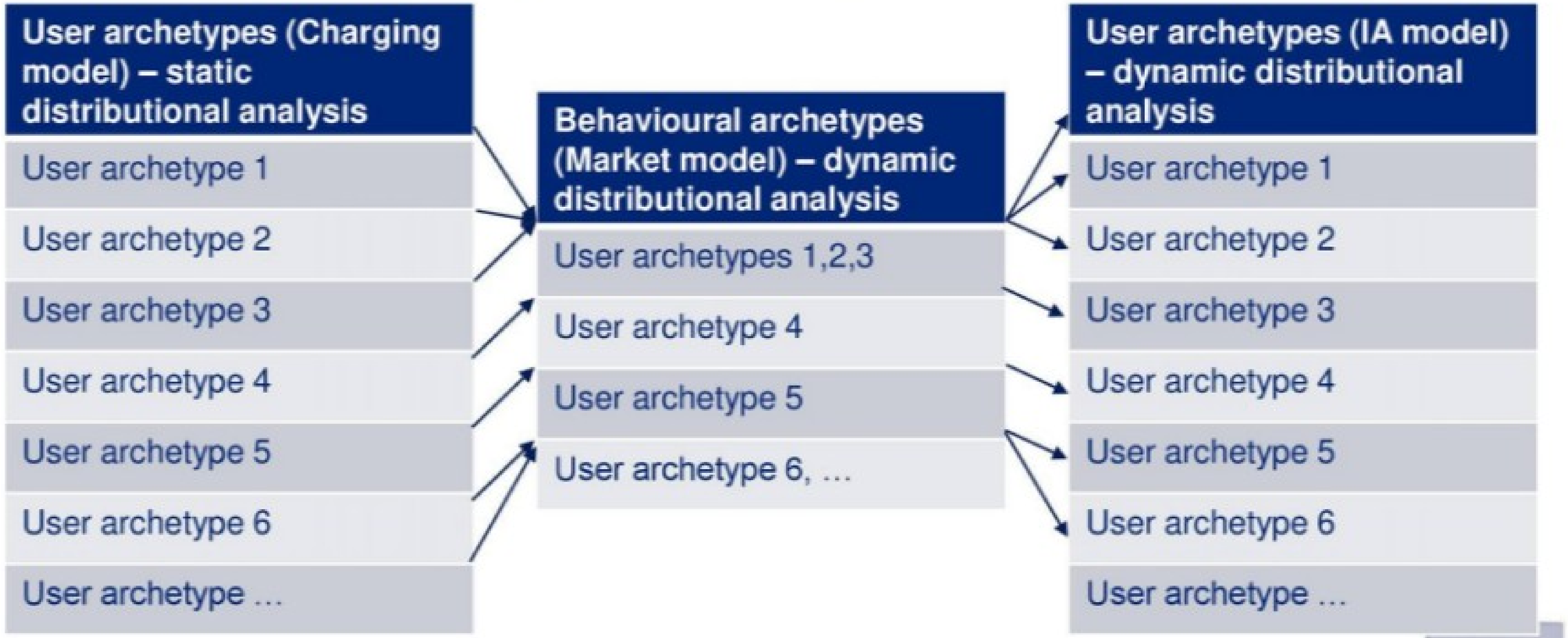
Consumer impacts

User archetypes

- We will model impacts across a number of user archetypes
- User archetypes will be aggregated in some models where behavioural responses and tariffs are expected to be similar
- However, the charging model and IA model will be designed to estimate impacts on the full range of user archetypes (data allowing)



Static distributional impacts on consumers

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Consumers: Distributional impacts

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As per Ofgem's recent distributional impacts guidance, we plan to cover the following metrics for each residential consumer archetype:

Metric
Absolute £ bill impact
Bill impact as a % of income
Equity-weighted £ bill impacts (as per the Green Book approach)

- Bill impacts would be calculated based on applicable charges under each charging option.
- We would also provide qualitative commentary and context to these quantitative impacts – based on information on socioeconomic indicators, energy market engagement and household use of smart technology for each archetype

Consumer archetypes covered

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We also intend to quantify impacts for a wide range of consumer archetypes. Depending availability of disaggregated data, proxy/aggregated consumer groups will be used in some cases.

- Statutory groups: low income, disability, pensionable age, and rural areas by income decile
- Groups identified in Ofgem's Consumer Vulnerability Strategy (CVS): unemployed, with no internet access, single parents
- Ofgem consumer archetypes:

Archetype	Main attributes
A1	High incomes, owner occupied, working age families, full time employment, low consumption, regular switchers
A2	High incomes, owner occupied, middle aged, full time employment, big houses, v high consumption, solar PV, environmental concerns
B3	Average incomes, retired, owner occupied - no mortgage, electric vehicles, environmental concerns, lapsed switchers, late adopters
B4	High incomes, owner occupied, part-type employed, high consumers, flexible lifestyles, environmental concerns
C5	Very low incomes, single female adult pensioners, non-switchers, prepayment meters, disconnected (no internet or smart phones)
D6	Low income, disability, fuel debt, prepayment meter, disengaged, social housing, BME households, single parents
D7	Middle aged to pensioners, full time work or retired, disability benefits, above average incomes, high consumers
E8	Low income, younger households, part-time work or unemployed, private or social renters, disengaged non-switchers
E9	High income, young renters, full time employments, private renters, early adopters, smart phones
F10	Middle aged/pensioners, full time/retired, owner occupied, higher incomes, oil heat, rural, environmental awareness, RHI, late adopters
G11	Younger couples/single adults, private renters, electric heat, employed, average incomes, early adopters, BME, low engagement
H12	Elderly, single adults, very low income, medium electricity consumers, never-switched, disconnected, fuel debt
H13	Off gas, low income, high electricity consumption, disability benefits, over 45s, low energy market engagement, late adopters

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Consumers: Points to note

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- We will **not be able to 'cross-segment' consumer archetypes** – e.g. to assess the impact on an elderly EV owner.
- Ofgem's consumer archetypes may **be less applicable to future years**. We will focus distributional impact analysis on initial spot years and comment on how we would expect distributional impacts to change over time.
- We are considering whether different **supplier pass-through/incentive assumptions** are needed/available for different archetypes?
- We will only break down impacts by % of income and equity weighted for residential consumers.
  - For **non-domestic consumers** we only intend to report absolute £ bill impacts.

Dynamic impacts on selected consumer archetypes

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Dynamic consumer archetype IA

- The dynamic IA will capture changes to each archetype's consumption patterns as a result of the charging options.
- We will report the impacts on consumer surplus relative to the status quo –separated into:
  - (i) the direct impact of changes in the system-wide price,
  - (ii) the direct impact of changes in the applicable tariffs,
  - (iii) the impact of the resulting difference in demand response – based on the interaction of the behavioural responsiveness of different archetypes and the changes in the price and tariff.

'Behavioural' archetypes

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- We propose some aggregation of consumers in the market model based on expected behavioural response to make the modelling tractable. There is a also a trade-off with complexity in other areas.
- The IA model will disaggregate impacts for more granular archetypes based on different consumption, in line with Ofgem's IA guidance.
- We intend to include the following 'behavioural' consumer archetypes.

Non-rational behavioural response	Fixed consumption profile: Commercial classes	Fixed consumption profile: Industrial classes
Domestic – Aggregated	Commercial – High consumption with onsite generation / storage	EHV-connected w/o onsite generation/demand management
Domestic – PV with storage	Commercial – High consumption w/o onsite generation / storage	EHV-connected with peak generation/demand management
Domestic – Electric Vehicles	Commercial – Light industrial HV-connected	T-connected with peak generation /demand management
Domestic – Heat Pumps (may be consolidated with another archetype)		T-connected w/o onsite generation/demand management
Commercial – Low consumption		

Generation archetypes will align closely with the FES

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Data requirements & FES alignment

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- To model each archetype, we will use **hourly energy consumption profiles** over the year.
  - We intend to align profiles with FES sources.
- We also need to align the **rate of adoption of different technologies** with the FES scenario(s) and year we choose to model – e.g. EV adoption with V2G.
- Beyond the above, the crucial parameters are the **behavioural demand responsiveness elasticities**.
- The behavioural demand elasticities of each consumer archetype in the market model is being defined based on our behavioural literature review and trial/study data in combination with an understanding of the behavioural assumptions incorporated into the FES.

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Behavioural response findings – Domestic consumers

- Based on our literature review we observe the following:
  - Limited evidence to support differentiation of **domestic consumers** based on (non-technology) characteristics, e.g. consumption/financial vulnerability. One study indicates low income consumers reflect similar responses to average consumers.[1]
  - Also limited evidence base to show different behavioural response from those with **heat pumps**. CLNR trial analyses consumers with heat pumps but has a very small sample size and limited results.[2]
  - Evidence of load shifting/peak shaving for **PV users with battery storage systems** limited to a small number of studies relevant to the UK context – i.e. similar solar radiance.[3, 4]
  - Little evidence of peak response of **PV without storage** outside of countries with high solar radiance.

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Behavioural response findings – Domestic consumers (cont)

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- Based on our literature review we find the following:
  - Stronger evidence base to show more significant behavioural response of **EV users** (though little which is statistically significant).[5, 6]
  - Some evidence on how **automation** and smart technology alters responses of consumers, particularly consumers with EVs and PV users with storage.[3, 5, 7]
  - Literature generally focuses on **load shifting** (assuming same total load), rather than on changes in total consumption (e.g. **peak shaving**).

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Behavioural response findings – Non-domestic consumers

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- Based on our literature review we find the following:
  - Evidence that small commercial consumers could be as/more inflexible than domestic consumers due to their limited ability to shift load.[8]
  - Limited evidence base to demonstrate the extent of rationality of larger non-domestic consumers, some of whom may also struggle to shift load.
  - Limited evidence base to support an assumption other than rational response of generators to price signals.

Behavioural modelling

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Behavioural response matrix

- 0 = inflexible demand, 3 = maximum behavioural change in response to signal

where scores (1-3) are mapped to percentage changes based on our analysis

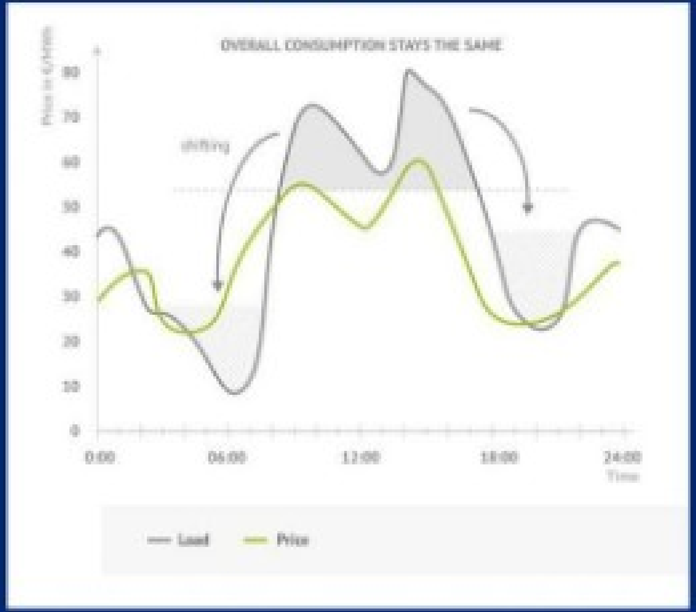
- We will start from the assumption that domestic consumers have inflexible demand but deviate from this based on strength of behavioural response (0-3)

Draft behavioural response matrix

Consumer archetype	Load shifting	
	Assumed strength of response	*Strength of evidence base*
Domestic	1	High
Domestic – PV with storage	3	Low
Domestic with EVs	3	Medium
Domestic – Heat pumps	?	Low
Commercial - low consumption	1	Medium

Load shifting

Intending to model as a storage unit allowing energy consumption to be smoothed over periods depending on signal



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Key References

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1. Faruqui and Aydin (2017) Moving forward with electricity tariff reform
2. Northern Powergrid et al. (2015) CLNR – Insight report: shifting domestic demand through appliance restriction as peak times
3. Northern Powergrid (2020) DS3 – Distributed Storage and Solar Study
4. Western Power Distribution (2017) Sunshine tariff
5. Octopus Energy (2018) Agile tariff report
6. RAP, Xcel Energy (2018) Two-period residential TOU electric vehicle tariff
7. Northern Powergrid et al. (2015) CLNR – Insight Report: Domestic Solar PV Customers with Automatic Balancing
8. Ireland Commission for Energy Regulation (2011) Electricity smart metering customer behaviour trials (CBT) findings report

Do you agree with our approach/assumptions on behavioural response?

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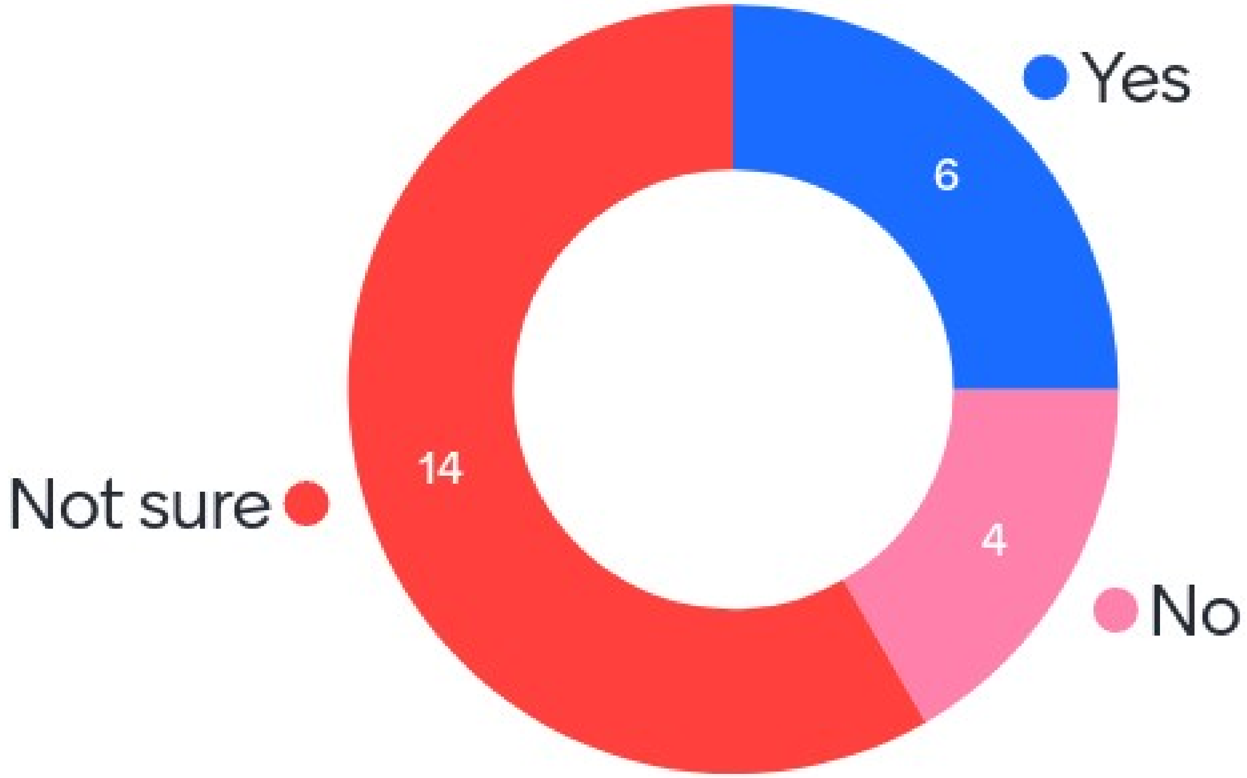

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Do you agree with the archetypes that we have aggregated to consider behavioural responses?

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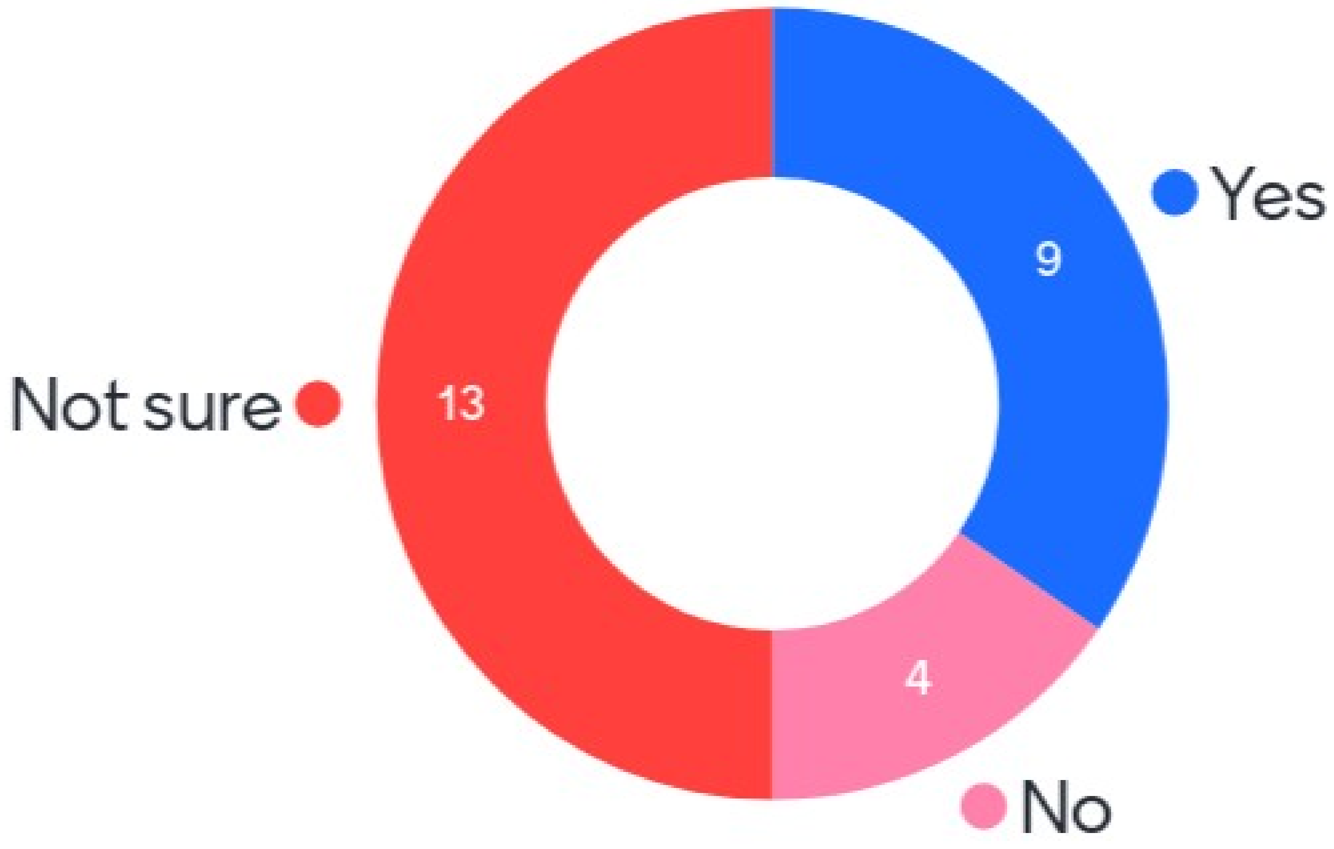

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Do you have any views on how to treat the behavioural response of heat pump users?

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At my day job i suspect we will - i will email you Lewis

How is DSR treated

Automation will be the key. I don't want to worry about this, but am happy to save money if it's done for me.

Why differentiate explicitly on user consumption reason?

May depend on storage, expect heat pump users with storage would be likely to respond, those without would be less likely to respond.

please consider other forms of electric heating (in particular infra red heating, which is much more dynamic). the role of heat pumps is being massively overplayed

Heat pumps with thermal storage are likely to show good responsiveness

Not sure it's right for behaviour response to be treated as storage (i.e. deferral) - not the case for some loads - lifts, lighting, decorative features etc - if these respond, there is no catch-up later on

I understand that there was a good Swiss regulator study on heat pump behaviour (albeit in a different cultural background) (I have no more detail - sorry)

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Do you have any views on how to treat the behavioural response of heat pump users?

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Focus on modelling "carrot" approach ie. credits for consuming power off-peak/over compared with "stick" approach of expensive prices at peak which could over incentivise BTMG

Would response be subject to temperature / weather condiotions?

heat stores (the old off peak units) and modern heat stores (multi-day storage) need to be considered as well as heat pumps - if not more so.

Also need to consider impact on the decision to buy a heat pump

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Do you have any additional evidence (preferably with statistically significant findings) that supports or challenges our assumptions?

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What about customers deciding to change their archetype?

I suspect that home automation will dominate how domestic behaviour changes. I think that this is a much more important study area.

What are assumptions on Supplier pass through of the structure and pricing of network tariffs into end user tariffs to have the expected effect (or not)?

Need to look at evidence behind what level of price signal was required to achieve the response in the studies used

Yes again from the day job (Active Building Centre) - agree with earlier observations that there are many more renewable heat technologies emerging that could trigger different behavioural responses

Can you use general price elasticity studies in energy?

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Impacts on generators

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Reminder: Approach for modelling generation capacity

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Approach	Advantages	Disadvantages
Option 1: Endogenous installed capacity expansion Allow the model to determine the level of installed capacity of different technologies based on price signals (including impact of charging options).	✓ Impacts of charging options on deployment determined endogenously	× Risks significant divergence from the FES & potential challenges with the robustness of results × May necessitate/imply policy choices that are beyond the scope of this exercise
Option 2: Exogenous installed capacity projections – based on FES Align the level of installed capacity of different technologies with FES scenario projections.	✓ Aligns with FES scenarios which are transparent and tested with stakeholders ✓ Requires no assumptions regarding policy outlook	× But does not implicitly capture technology investment decisions ▪ **We discuss how we propose to incorporate potential impacts in the following slides**

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Impacts on policy scheme costs

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- Under our exogenous generation capacity approach, some technologies may face a 'revenue gap' – i.e. modelled market revenues do not meet operational costs and annualised capital expenditure i.e. their levelised cost of electricity (LCOE).
- Our modelling approach implicitly assumes that adequate policy support (e.g. through CfDs) would:
  - make these generators whole; and
  - ensure that the observed levels of investment are achieved.
- The size of any 'revenue gap' would be estimated using the effective price captured by different generation technologies.

Note: We will interpret the observed revenue gap under a given charging option in two ways:

1. The additional/reduced level of policy support that would be needed to deliver investment relative to status quo, or
2. The additional/reduced risk of under-investment in the case that policy support levels/investor certainty do not adapt sufficiently.

Impacts on capacity market costs

- FES scenarios incorporate the Government's loss of load expectation standard and hence a capacity margin that reflects the security of supply level required.
  - We take the stipulated amount of capacity required as a given.
- Operationally, **some plants required for resource adequacy may not be able to recover costs** through net market revenues alone.
  - For existing plants, we estimate whether market revenues are sufficient to meet fixed operating and maintenance costs or 'missing money'.
  - For eligible new-build plants, we include capital costs as well as operating and maintenance.
- To determine CM impacts, we would rank the eligible plants in ascending order by the missing money metric respectively.
  - The most expensive technology would represent the clearing offer, giving us the CM price.
  - We would then use this price and plant de-rated capacities to calculate CM market costs.
- As before, an alternative interpretation may be the level of risk of investment in plant which cannot recover its costs

Investment and closure analysis

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- We would also use the market revenues (£/MWh) captured by different generation technologies in the market over our modelling period (i.e. to 2040) to capture **long-term impacts on generation capacity.**
- We would then compare these revenues net of the relevant locational charges, to each generation technology's:
  - **levelised cost of electricity (LCOE)** – to inform the likelihood of new investment (and/or the need for further policy support to reach the projected level of capacity as per the previous slide);
  - **levelised cost of electricity (LCOE) for repowering investment (data allowing)** – to inform the likelihood of repowering vs. decommissioning existing capacity (and/or the need for further policy support)
  - **levelised fixed operational and maintenance (FOM) cost** – to inform premature closure (and/or the need for further policy support)

This analysis will enable us to:

- compare impacts on technology revenues between options & against the counterfactual, and
- comment on the relative locational incentives for investment and closure of different technology types under the option packages.

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CO2 emissions

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- We take the levels of installed capacity and demand as given, as per the FES scenarios. But this does not necessarily guarantee that the included CO2 reductions will be met based on operational decisions.

Option 1: Include explicit CO2 target
Constrain modelled CO2 to be at or below a set target level in line with the chosen FES scenario (e.g. Net Zero)

✓ Guaranteed to meet emissions targets consistent with chosen FES scenario
- Impact could be measured as the difference in system and support costs of meeting target.

× Impacts of charging options on operational incentives for generation types not fully considered

× Under an exogenous capacity assumption, the relative costs of reaching a given CO2 target could only be considered in a limited sense.

Option 2: Model CO2 emissions endogenously
Any changes in demand/generation mix as a result of a charging option could impact on CO2 levels.

✓ CO2 emissions under each charging option could be measured and monetised.

✓ Operational market outcomes would be optimised given carbon price, commodity prices, and demand/generation inputs, without distortion from other constraints.

× Some risk of not meeting emissions levels in scenario
- FES scenarios would include installed capacity to achieve the relevant CO2 emission levels. Therefore, modelling will provide insight as to the operational incentives for achievement of these CO2 emission reductions.

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Generator impacts

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In addition to the revenue gap of installed capacity, we expect to report the following impacts on the basis of the market modelling results:

- **Impact on locational allocation of capacity** – what effect would different charging options have on the optimal location of different technologies?
- **Impact on generation mix** – how does the operational generation mix change as a result of the different charging options?
    - E.g. what is the impact on RES curtailment and the proportion of gas-fired generation from peaking plants?
- **Impact on the effective price captured in the market** – price captured in the day-ahead market (DAM) and as a result of constraint management actions.
    - We can report on the impact on the effective price captured by technology on the system as a whole, as well as for different technologies within individual zones.
    - This would allow for qualitative comment on potential impacts on the capacity mix, given market outcomes.

Optimising locational allocation

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- The overall installed capacity for each generation technology will be set by the FES scenario, but there is an option for the modelling to allow for some endogenous regional allocation of capacity.

KEY INPUTS

Current/historical locational allocation

Charging by zone

→ Potentially other costs that may vary by zone. E.g. connection costs?

CONSTRAINTS

+/-MW ranges – can vary by tech

Minima based on existing generation (with % of closures considered)

Any adjustments to reflect regional differences in natural resource availability (where data is available)

For later modelled years: optimal locational allocation determined in earlier years will also be an input/constraint

OUTPUTS

Optimal locational allocation by zone

→ How important are connection charges as a driver of locational investment in comparison to other drivers?

Do you agree with our proposed approach to model operational CO2 emissions without including an explicit constraint on levels of CO2 emissions?

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Yes

Yes

Yes

It is a valid way forward.

Yes.

Yes. Central Government should cap CO2 emissions.

It's a shame you can't constrain the CO2 within a limit, but OK, it's been explained

Yes

Broadly. This is the first sight... would CEPA/Ofgem be willing to speak with RUK about this slidepack directly to get views and feedback on your specific Qs? This can be arranged in the next week if so.

Do you agree with our proposed approach to model operational CO_2 emissions without including an explicit constraint on levels of CO_2 emissions?

Mentimeter

Yes, but suggest bringing out the resulting emissions so you can intervene if the emissions stray too far

yes, in theory co2 reductions are captured in the FES scenario

yes

Yes. Important to see how CO2 emissions change if there is out of merit operational dispatch from DG and BTMG unabated thermal generation in order to earn TOU credits in periods where there is no network constraint reason for them to generate

.

Connection charge for demand is limited (swamped by other costs), for generation it is much greater

In comparison to other locational drivers, to what extent are connection charges included within decisions of which distribution zone to connect to?

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Charges are a massive consideration. They can and do kill projects

Ultimately modest across project life, but can be a significant up front cost. Rarely determinitive once you have a site.

they form a critical part of the overall investment decision- on balance with other drivers- can in cases be prohibitive to project commencement

Timing and ongoing charging probably more important

Charge impact is large. Also availability of renewable resource

DNO charges/credits are a crucial component of where to locate our plant

Limited. It's more to do with access to customers, skilled workers, transport links etc

connection charges less of an impact than LAs planning regimes, rarely determine go/no go of projects

Under todays arrangements, the connection cost is a far higher driver than UoS. As a signal it probably more impacts the size of the request in a given location rather than the location itself

18

In comparison to other locational drivers, to what extent are connection charges included within decisions of which distribution zone to connect to?

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Agree that connection charges can and do kill projects

Charges/credits are have a huge impact on where we choose to develop generation projects.

not that relevant is more about queue and fuel source

limited in the main with the more material wider reinforcement being socialised. driven more by constraints and zone charge. Customers will seek to avoid expensive connection asset schemes though.

Very limited

For renewables it's rare to get a choice of DNO zone. You locate where the best resources are

I think this is a very important driver - particularly in terms of generation zones. Network charges and not just connection charges will highly impact decisions. You also need to take into consideration the rezoning of generation zones in riio-2

Important if there are choices

Answer is different if you mean locationally across GB, or locationally across a DNO area

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Do you have any views on the bounds that should be incorporated into locational investment decisions of different types of technology?

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?

needs assumptions of planning probability success, consenting for less preferred technology types etc. Networks themselves cannot discriminate unless legislated to do so.

Do ESO have view on maximum potential boundary flows?

I suspect that location charges will be most important for the closure of existing plant, rather than the opening of new

technology should be assessed on its reliability to enable networks to plan/avoid grid reinforcement. The same derating factors applied in the CM should be applied to credits/charges

Take account of wind resource being much higher in North, so LCOE in North should generally be cheaper

Impact of charges from Scotland to Cornwall on LCOE of different techs?

network charges i.e. locational tariffs

I feel this needs further explanation! I want to help, but I don't get it right now

20

Do you have any views on the bounds that should be incorporated into locational investment decisions of different types of technology?

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Why is resource availability considered a better proxy than planning regime?

What are you assuming about LCOE of onshore wind vs offfshore wind and nuclear ? Offshore wind could end up being cheapest

Variability and predictability impact of load / output?

Queues, DNO service etc

Will it only be limited to ne technology or include tech such as H2 and CCS

scale of impact on generator revenue

grid reinforcement timeline

Overall cost to generators - transmission connected generators

a key output is the potential impact on flexibility provision. forward looking signals are critical to ensure the DNOs have the capacity to procure flexibility when its needed. how will changes impact DNOs potential to transition to DSOs

20

Do you have any views on the bounds that should be incorporated into locational investment decisions of different types of technology?

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.

constrained zones

20

Are there any other outputs you would want to see from the modelling of impacts on generators?

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Load factors?

impact on existing site operations particularly where highly leveraged- taking into consideration potential long term low wholesale prices

How sensitive generators are to price signals. If it doesn't matter because the sun is in the south and the wind farms are all offshore and how difficult the seabed is, then this is a key results (and says that we can all go home early)

How many genertors will have a revenue shortfall and what that means against the scenarios if policy support isn't available

Will it include new Tech that does not currently exist at scale ie H2 or CCS

Total cost and CO2 impact of out of merit operational dispatch in order to earn TOU network credits at times when there is no network constraint reason to generate

Straight up impact of GB plc's ability to meet net zero at different speeds if different packages of Ofgem charging reforms are implemented. What is consumer cost impact (whole system, holistic, not just cherry-picked)

Long term utilisation to support decision to invest in new plant

I want to know how BEIS feel about Ofgem passing the entire net zero/Decarb buck to them!

10

Are there any other outputs you would want to see from the modelling of impacts on generators?

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cross-competition impacts on GB (transmission and distribution) and EU-connected plant

10

Market representation and transmission network constraints

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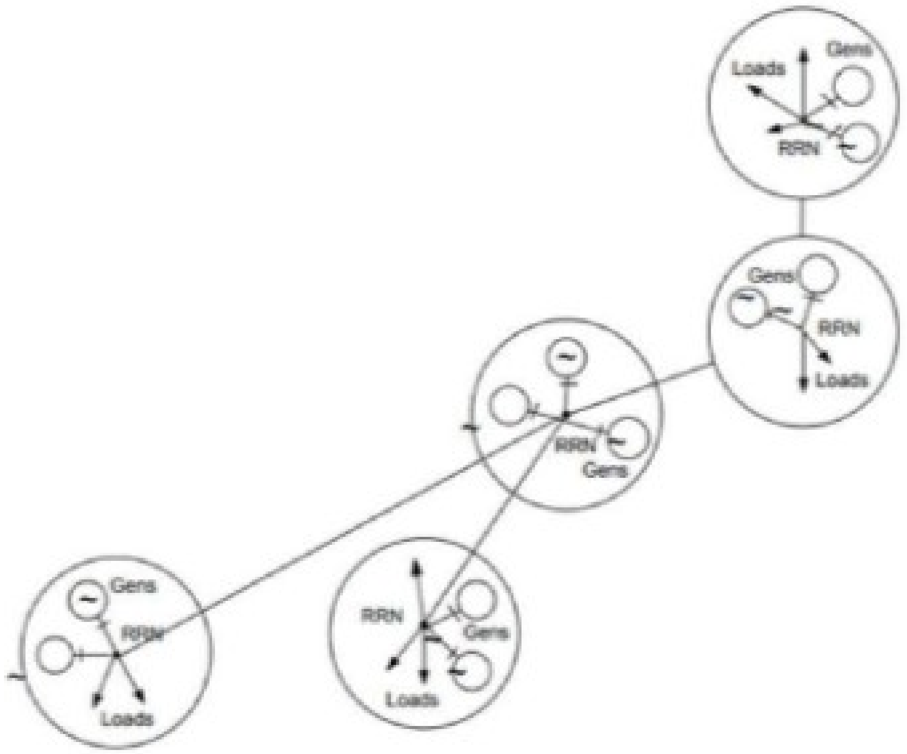
Market representation

- '**Hub and spoke**' representation of the GB market. Zones in the model:
  - Seven key transmission zones (selected after engagement with the ESO's NOA team)
    - each zone will include an aggregated TNUoS generation charge.
  - We intend to incorporate different charges for all 14 TNUoS demand zones.
- Each zone includes one node for each generation technology type and demand archetype
- Boundaries across zones include capacity limits, loss factors
- The ESO has informed assumptions for unit costs of transmission network expansion



Transmission network constraints

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- For the six transmission network boundaries that separate these zones, we will **endogenously determine optimal network capacity expansion** as an output of the IA.
- We would also estimate **costs of constraint management actions** across these six key boundaries.
- The model would consider the trade-off of these operational costs against a simplified assumed annuitised cost of network investment (i.e. in £/MW/year of asset life – also informed by the ESO) in determining the optimal level of capacity expansion.

Distribution network representation and reinforcement

Distribution network modelling

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- We are modelling EHV networks to analyse:
  - Locational connection decisions within each distribution zone
  - Costs to DNOs of distribution reinforcement and flexibility services under each option
  - Avoided reinforcement costs due to each policy option
- We are trying to analyse a wide representative range of possible network conditions, possible charges, connection prospects, etc rather than forecasting precise charges/costs on any one network.
- We do not consider it proportionate to model the HV and LV networks. In our view:
  - Impacts would be subject to a wide bound of uncertainty and dependent upon modelling assumptions made.
    - Smaller numbers of users on each LV network lead to less certainty of response for DNOs
    - Asymmetric impacts of errors in expectations of behavioural response
  - Modelling would be complex and reliant on more simplifications/ abstractions than are included in the modelling framework more generally

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High level overview

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Network and capacity

Underlying network topology and capacity comes from the DNOs.	Simple rules and assumptions to apply consumer scenarios (e.g. fewer EVs in rural areas)	Changes in behaviour from ToU tariffs

Connections

Intra-licence area connection decisions	Responding to signals from DUoS, Access Rights, and Connection Charges	For large generators, and *possibly* some large demand

Reinforcement and flexibility

Modelling DNO's decisions to add new network capacity	We intend to include third-party flexibility services as an alternative option

HV/LV network modelling

- However, we do expect that policy options may allow for costs/benefits to be realised at HV/LV network levels through avoided reinforcement, etc.
- The benefits may become more realisable over time as DNOs develop confidence in user behaviour to allow for incorporation into planning and as larger loads seek to connect
- For HV/LV costs/benefits, we intend to comment qualitatively on the potential range of impacts based on our analysis of EHV network.
- Where possible, we'll consider other recent analysis of LV and HV network costs (e.g. ENA analysis)

Lower bound ⟷ Upper bound

Little relative impact. More likely in earlier years before confidence in response is developed.

Impacts proportionate to costs/savings at EHV level. More likely in later years where DNOs incorporate into planning.

Granularity of outputs

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Granularity of outputs

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- Where possible and where difference are most relevant, we will report generation and demand impacts down to the distribution zone level.
- However, below the distribution zone level, we consider that more granular impacts are subject to a broader range of uncertainty. Hence reporting very granular impacts could introduce inappropriate accuracy
- We will therefore report charges and impacts within a distribution zone at an aggregated level.
- For example we may report:
  - The overall range (or 5th and 95th percentile range) of charges within each distribution zone.
  - Aggregate charges reported by key characteristics for some user archetypes – e.g. rural vs urban network users

What data sources might we use to inform the costs of flexibility services to DNOs?

Recent tenders such as ikon winter 2020

DNO tendering for flexibility services

Flex tenders via picli and level of capacity procured

when you say costs do you also mean value of flexibility services? (avoided reinforcement etc)

DNOs should be best placed to provide this data

UKPN publish the range of avoided reinforcement costs in their tenders

Not ikon should be ukpn

As part of their flexibility tenders, UKPN publishes a "Revenue Range" which flexible providers can expect to earn through contracts. The revenue ranges are derived from deferred reinforcement costs.

the lower of PV cost of conventional solutions v flebility services since tariffs

12

What data sources might we use to inform the costs of flexibility services to DNOs?

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Assessment of what could be available from smart EV charging at little cost

The prices achieved in the recent tenders reflect the charging status quo. Flexibility prices would have to go up if credits were reduced, and tenders would need to be published years in advance of COD dates

are you capturing security of supply ?

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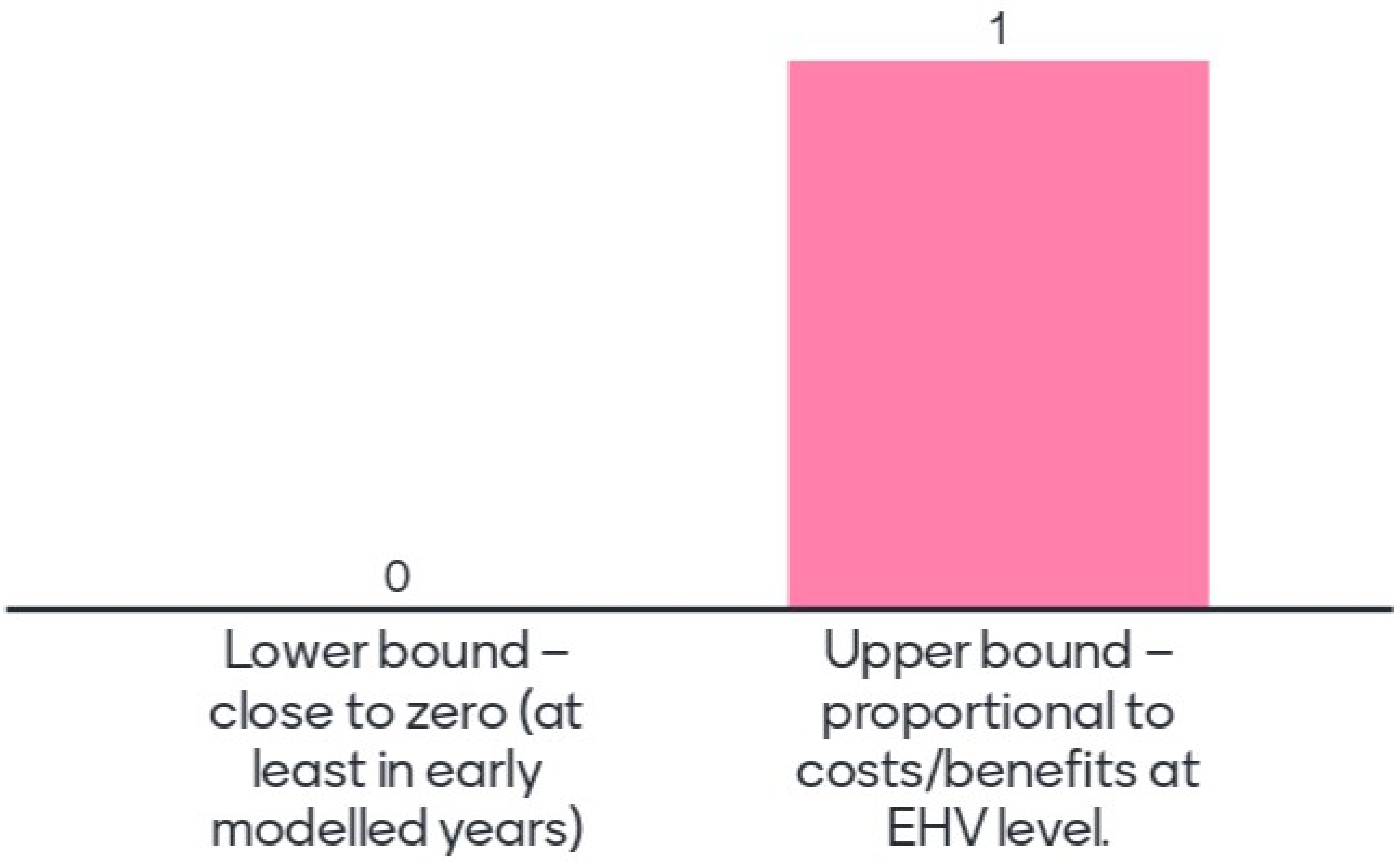
Do you agree with our proposal that the range of impacts on the HV/LV networks should be relatively broad and bound within:



1

What are the key characteristics (e.g. urban vs rural) against which you would like to understand the variation in charges within a distribution zone?

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- Impact of penetration of EV and heat pumps
- The penetration and take up of low carbon technologies
- Regional variations: rural/sparse v urban/dense - local authorities - islands
- Should model lv network as uptake of evs likely to cause problems here which are not proportionate to the issues at ehv
- Whether zones (e.g. Primary Substations) are constrained/approaching reinforcement triggered by demand or generation.
- a justified difference in costs across network types.
- By voltage by DNO
- value of carbon should be a key regional characteristic
- within customer segments and also from one segment to another

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What are the key characteristics (e.g. urban vs rural) against which you would like to understand the variation in charges within a distribution zone?

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This all demonstrates the need for financial firmness to provide cost signals - without this we retain an undue distortion and impede efficient solutions to constraints

I think Ofgem is considering charging at GSP, BSP and Primary. Can you say how you model this?

Impact of activated buildings; and homes/buildings that are designed and managed to be grid supporting

Primaries have urban circuits but also rural circuits. How to split?

Demand dominated vs generation dominated area

Need to consider different network topologies - radial, ring, interconnected etc

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Are there any other outputs you would want to see from the modelling of transmission and distribution networks?

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LV EHV: don't agree with approach. Some Lv will see issues that may not manifest At ehv

An indication of what "decarb at lowest cost to the consumer" could actually look like. In terms of speed, alignment to FES scenarios and using a holistic approach to consumer costs.

Happy with lower bound/upper bound approach - the upper bound for flex may be higher than the cost of reinforcement where optionality is seen as important.

impacts on Tx interface costs from Dx customer behaviour

the level of costs on generators due to the impacts

HB/LV Not convinced this will be liked to EHV charges. I expect it to relate more to whether the network is urban/suburban/rural

Avoided power cuts (or local curtailments of EV/heat pump rollouts via ministerial panic measures - it's one or the other) as a result of the benefits of RAFLC, instead of baseline

HV LV should get proper consideration itself. Show the scale £m of HV LV network cost vs EHV ie how big a proportion is it to reinforce ?

HV networks should have their own consideration/modelling.

14

Are there any other outputs you would want to see from the modelling of transmission and distribution networks?

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Agree with HV LV points here - they should get proper consideration

Clustering will be a key driver of reinforcement at the lower levels of the network, will this be factored in - perhaps a sensitivity?

are you capturing security of supply ?

are you capturing grid stability risks?

Impact of financial firmness would be good to see

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Option packaging for modelling

Impact assessment webinar

08/07/2020

Modelling of the proposed reform options will inform our principles-based decision

- As the basis for this modelling, we are developing **packages of coherent sets of reform options** across our policy areas which **could be implemented together** and will be **modelled jointly**.
- In parallel, we are also exploring **potential sensitivities or other supporting analysis**, which may allow us to test **option variants** or isolate the impacts of **specific aspects of reforms**.

A reminder of key shortlisted options for modelling

DUoS cost models and locational granularity

Ultra long run cost model with / without spare capacity indicator

Granularity of EHV costs by primary / BSP group for EHV only / all customers

Upstream only charges, equal and opposite credits

Access rights

Improved choice of non-firm, time-profiled and potentially shared access rights.

***Principal variables for structuring modelling packages**

DUoS charge design*

Static ToU

Agreed capacity

TNUoS

Static ToU

Seasonal triad (large users)

DG charges

*** These may be combined and include a fixed charge component**

Connection boundary

Shallow charges

Shallower charges

Shallowish charges

Small users

Basic charging options

Adaptations – to reduce seasonality / locational granularity

Overview of packaging approach

As the basis for modelling, we are developing packages of coherent sets of reform options across our policy areas which could be implemented together and will be modelled jointly.

- In parallel, we are also exploring **potential sensitivities or other supporting analysis**, which may allow us to test **option variants** or isolate the impacts of **specific aspects of reforms**.

Our approach and key considerations

Our principles-based assessment informs the set of options for each package to model. In formulating these packages, and other variants to model, we are also considering:

- **How well options work together** in practice, considering compatibility with other aspects for a coherent set of reform options
- Which aspects would be expected to differ in their **system benefits, decarbonisation pathways** and **distributional impacts** – and where we therefore expect modelling to offer particular insights for our choice of options, considering our principles, and
- Where modelling may best help us **assess impacts proportionately**, including where building an understanding of particular impacts of **certain policy options** or potentially reform for **certain stakeholder groups** would be particularly valuable (eg domestic consumers who may be in vulnerable situations).

Today's discussion

Here we outline and seek your input on an updated **view of potential packaging** and areas for **additional analysis**, which we **continue to refine** as we finalise our approach to modelling. In particular

- We may streamline the set of packages for modelling further within this envelop, and
- We are considering where supplementary modelling of other option variants or sensitivities would have most value.

Main variables for packages

Our current view is packages would be structured around **options for the DUoS cost model** and **level of locational granularity.** Alongside this, each package will also include a fully specified set of **options across all policy areas**.

Proposed principal variables for structuring modelling packages:

- DUoS cost models and locational granularity
- Ultra long run cost model with / without spare capacity indicator
- Granularity of EHV costs by primary / BSP group for EHV only / all customers

These would translate to **a matrix of packages** structured around these variables as follows:

Potential fully modelled packages

To be modelled alongside the baseline

Locational granularity* ↑ / **Cost model sophistication** →		
	1 • **Ultra long run** cost model • **Primary substation** level granularity	**3** • **Ultra long run** cost model **with spare capacity indicator** • **Primary substation** level granularity
	2 • **Ultra long run** cost model • **BSP** level granularity	**4** • **Ultra long run** cost model **with spare capacity indicator** • **BSP** level granularity

Cost model sophistication

**Nb This reflects our current thinking for locational granularity though we continue to develop our assessment. Should we reach a decision on a principles basis ahead of modelling, we would expect to focus this locational granularity axis on packages with and without layering of EHV charges for customers at the lower voltage levels.*

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Other policy aspects included in packages

We currently expect to reach a **single option for modelling packages** for most other policy areas on a **principles basis**, as set out below. Where we see **particular value**, we may assess a **limited number of alternatives** through sensitivities or additional analysis.

Policy workstream	Option expected to be included in main packages *(current expectation on basis of initial assessment)*	Potential sensitivities or variants being considered for modelling
Access rights	**Large users:** Access choices included in all modelled packages (non-firm, time-profiled) valued through discounts to DUoS, connection charges or a combination, depending on con. boundary **Small users:** no enhanced access choices offered	We expect access reforms to be low regret, though a sensitivity could help assess their benefits vs other areas
DUoS charge design*	**Small demand users:** Static ToU with a fixed charge element **Large demand users:** Hybrid of static ToU and agreed capacity, with a fixed charge element **DG:** charge design as for demand, with inverse of ToU charge *nb charges / credits based on dominant flows	We don't currently expect to model alternative DUoS charge design options. We may model sensitivities to specifically assess the impact of options that increase DUoS and TNUoS charges for DG with shallower connection charges, or a variant that maintained a shallowish boundary
TNUoS	**Small demand users:** Static ToU charge **Large demand users:** Revised (seasonal) triad **DG:** generator charges apply	We may model an alternative variant of static ToU charges for large users. As above, we may model a sensitivity to specifically assess the impact of DUoS and TNUoS changes that increase charges for DG.
Connection boundary	**EHV:** Shallow connection boundary for EHV connected customers under packages with spare capacity indicator, shallower without. **HV / LV:** Shallower option for customers at HV / LV. **Small users:** existing 100A limit would continue to apply.	We are likely to assess an alternative option variant through a sensitivity to compare these options more fully, including against a shallowish option.
Small users	Main charging options modelled as applied above, together with an early principles based assessment of distributional impacts.	We expect to use sensitivities to help assess the specific benefits / impacts of reform for small users. We may also model variants which remove seasonality or reduce locational granularity in small users' charges, if distributional analysis suggests this could be merited.

Do you agree with the proposed basis for packaging?

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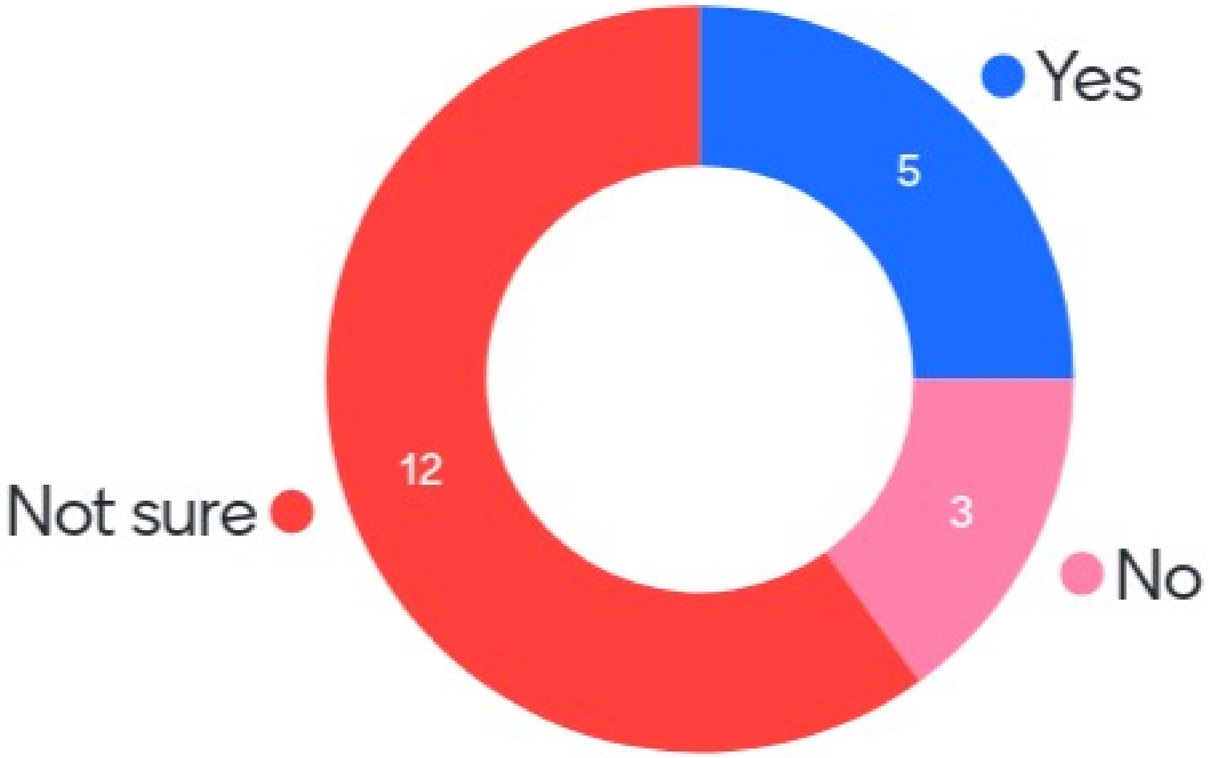

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Why / why not? What would you change?

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need a little more time to process !

I would add in the reference node assessment that is being looked at separately

I think the options for granularity of locational charges needs to be further considered before being defined for IA modelling.

Generally happy with the option ranges but not clear on the specific package permutations.

can you clarify whether the options not being modelled are being taken forward or dropped?

Should consider a scenario with capacity based charging to incentivise investment combined with flexibility markets to incentivise operational dispatch

More granular timebands rather than more locational granularity in order to incentivise load shifting.

Not clear on how a spare capacity indicator is to be structured - and if it is clear enough to be modelled.

Too bottom-up. Needs some top-down "what do we need to get to net zero at lowest consumer cost" element to it

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Why / why not? What would you change?

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Not particularly clear what is decided as a consequence of principles prioir to assesssmen tof modelling

how is the reference node analysis corresponding to the outlined packages? will it be considered once the assessment is complete (by September) or in conjunction?

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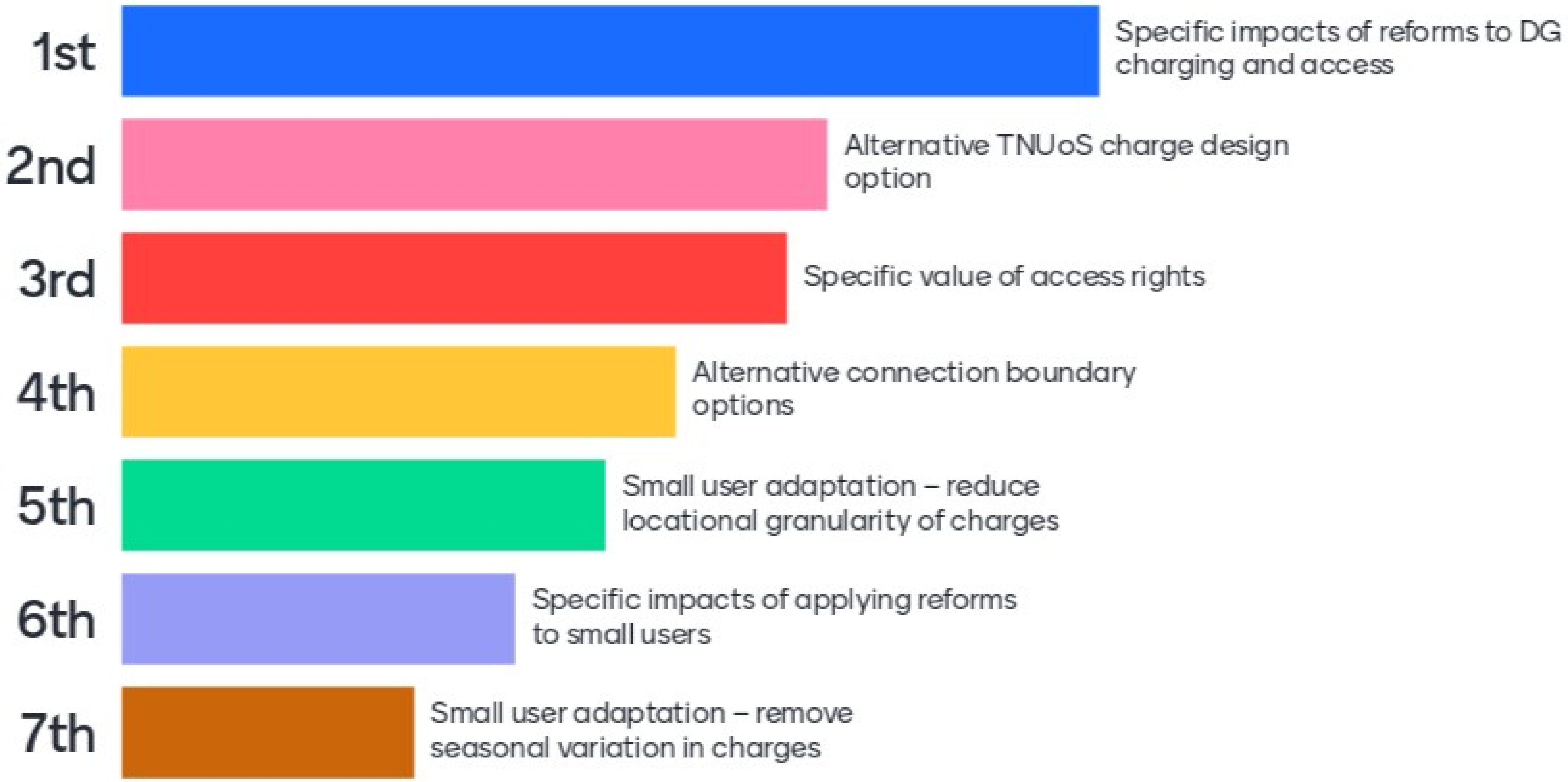
What are your views on the priority option variants / sensitivities to model (please rank in order of preference)



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Are there other priority variants or sensitivities you think should be modelled, or do you have other comments on these choices?

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sensitivity to shift in reference node methodology

Split between residual charges and forward looking charges

the other network reforms taking place i.e rezoning, TGR=zero etc , impact of these changes on TGs

As per question just asked: do proposals tend to promote or hinder the adoption of low carbon technology such as EV and Heat Pumps

open question of outcome of cmp324/5 on Tx DG zones

The reference node

Sensititivity to offshore transmission and change of constraints.

the majority of demand users are connected at HV/LV. the greatest need for reinforcement will be at this level and we are already seeing DNOs procure flexibility at 11kV. it is really important that HV/LV impacts are considered

8

Ask me anything

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55 questions
160 upvotes

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Our core purpose is to ensure that all consumers can get good value and service from the energy market. In support of this we favour market solutions where practical, incentive regulation for monopolies and an approach that seeks to enable innovation and beneficial change whilst protecting consumers.

We will ensure that Ofgem will operate as an efficient organisation, driven by skilled and empowered staff, that will act quickly, predictably and effectively in the consumer interest, based on independent and transparent insight into consumers' experiences and the operation of energy systems and markets.

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Implementation Costs RfI

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Objective of this session: giving early sight and gathering feedback on a proposed request for information on implementation costs of the options we are modelling

- Objective of the RfI:
  - Quantification of impact of 2023 implementation on:
    - Upfront costs of IT system changes (e.g. billing systems)
    - Upfront costs of internal process changes
    - Changes to ongoing costs of internal processes
  - Practicality of that implementation timescale and sensitivity of cost estimates to other implementation timescales
  - Interaction of system changes with those for other workstreams (e.g. settlement reform)
  - Will sit alongside our IA modelling work
- Questions on each policy area in turn
  - Focus is on a subset of our shortlisted options (those we are modelling)
  - We are not ruling out other options – but want the RfI to relate closely to our modelling

Please provide feedback on our proposed approach to this RfI (not answers to the questions!) via Menti throughout the session

Timescales

Today – Challenge Group Feedback

↓

09/07 – focussed discussion with Delivery Group

↓

15/07 – RfI issued

↓

14/08 – RfI closes

Response will be mandatory for DNOs and large suppliers
Optional for small suppliers, IDNOs and other interested parties

Whilst the RfI is open, we will host an industry workshop to discuss points of detail for clarification on the questions

Questions for DNOs on charge calculation:

- Detail of charging models not yet known, so we intend to quantify the cost of operating existing charging models (including power flow modelling) as a proxy for different approaches
  - …but welcome thoughts from DNOs on alternative approaches to quantifying costs of charge setting

Questions for DNOs, IDNOs and suppliers on invoicing:

- Costs of managing an increased number of tariffs…
  - ~800 (BSP granularity) or ~5,800 (primary granularity) sets of tariffs
- …with different timeband options
  - Fixed DNO-wide RAG timebands, location specific RAG timebands or short GB-wide timebands (e.g. EFA blocks)

Questions for DNOs, IDNOs and suppliers on charge design:

- Costs of aligning UMS timebands to those for metered customers; and any costs of generation capacity charges

- On TNUoS for small DG, options remain for:
  - The ESO to invoice small DG direct,
  - The ESO to charge small DG via suppliers (ESO invoices supplier, supplier invoices DG)
  - The ESO to charge small DG via DNOs (ESO invoices DNO, DNO invoices DG)

Questions for ESO on charges for small DG:

- Costs of managing ESO to DG capacity agreements if needed
- Cost of calculating and levying TNUoS for small DG under each option

Questions for suppliers and DNOs on charges for small DG:

- Costs of processing and passing through invoices to DG

Questions for ESO and suppliers on charges for demand:

- Costs of calculating and invoicing demand charges based on:
  - Usage 4-7pm for all users with seasonal variation
  - 4-7pm usage for small users and modified Triad for large users, both with seasonal variation

Questions for DNOs and IDNOs only:

- Not expecting material costs of (e.g.) change to allocation factors or the voltage rule
- Seeking input on costs of managing systems and administration for:
    - An option placing liabilities on connectees and requiring them to lodge associated securities
    - An option enabling connectees to pay connection charges over a period of time

Questions for DNOs and IDNOs only:

- Costs associated with:
    - Non-firm access rights
    - Time profiled access rights
    - Shared access rights

Questions for ESO

- Will costs be incurred if the definition and choice of distribution access rights is improved?

Questions for suppliers

- Any implementation costs associated with customers having better defined access rights
- Any variation in costs is access rights are valued through varying Use of System charges rather than connection charges

Next steps

Mentimeter

- Your feedback will input into development of the RfI ahead of issue next week
- We will hold a stakeholder workshop while the RfI is open
- We are open to bilateral discussions with individual respondents on any points of detail
- We are keen to engage. Feel free to contact us directly on FutureChargingandAccess@ofgem.gov.uk

Any comments or questions?

Mentimeter

are you interested in costs for central systems/services?

Are you interested in central system costs, impacts and opportunities?

Costs of gathering data ongoing to provide inputs to more granular charging?

RFI : Not clear is there a draft template off the questions ? Month might not be long enough for suppliers

Do you want costs independent of other changes such as hhs

Is it possible to answer some of the questions

Are responses to this RFI not targeted at the generation community?

RFI : What definition of large supplier are you using

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